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## THE STATISTICAL WORK OF SÜSSMILCH.

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The subject here presented was chosen for a doctor's dissertation while the writer was pursuing studies in statistics, economics, and sociology in Cornell University. The discovery was made that a copy of one of the first imprints of Süßmilch's *Die Göttliche Ordnung*, dated 1742, and an exceedingly rare book, was available in the library of the Surgeon-General in Washington, D. C. Through the courtesy of the librarian of the Surgeon-General's library the copy was loaned to the University for a limited period, and the writer's interest thus aroused induced him to choose for the subject of his thesis *The Statistical Work of Süßmilch*.

The bibliography of the writings of Süßmilch, which forms Part iv of the following essay, was published as a trial bibliography in *The Quarterly Publications of the American Statistical Association*, September, 1897, under the joint authorship of Professor Walter F. Willcox and the present writer. Acknowledgment is here gratefully made of the assistance rendered by Professor Willcox in the compilation of the bibliography, and for many helpful suggestions and kindly criticisms throughout the preparation of the following paper. Thanks are also due to the librarians of the principal libraries of Europe and America for their prompt and willing assistance in the work of making the bibliography as complete and accurate as

possible, and particularly to Professor v. John of Innsbruck, and Professor R. Boeckh of Berlin, who were able to add several titles to those we had compiled, and to correct some that were included in our original list.

If any apology is needed for the following somewhat extended discussion of Süssmilch, it is found in the fact that he occupies a unique place in the historical development of population statistics, and heretofore there has been no presentation, in English, of his work and ideas at all adequate to meet the requirements of American and English students of the subject.

### *I. Biographical Sketch.*<sup>1</sup>

The Süssmilch family can be traced back to northeastern Bohemia, where it received from Maximilian I, in 1513, the hereditary judgeship of the Lusatian stronghold of Tollenstein, situated about three miles from Zittau. Christof Süssmilch held this office of judge from 1600 to 1634, and his second son, Elias, the great-grandfather of Johann Peter Süssmilch, succeeded him. This Elias had been led to embrace the Protestant faith, but his second wife persuaded him to turn again to the Roman Church. By his first marriage he had one son, also named Elias, the grandfather of Johann Peter. This son did not favor his father's change of belief and himself remained a Protestant. As a result of his religious convictions he was exposed in 1650 to the persecutions which the Bohemian Protestants suffered at the hands of the Emperor Ferdinand III, and in addition was subjected to harassments by the relatives of his step-mother. It is chronicled that young Elias preferred the safety of his

<sup>1</sup> No good biography of Süssmilch exists. John, who has written a short sketch of Süssmilch's life in the *Deutsche Biographie*, there mentions the only sources from which he was able to get his facts. These were three in number: Christian Förster's biography, 1768; a biography in the 18th part of *Neuen Gelehrten Europa*; and a short biographical sketch in Formey's *Histoire de l'Académie Royale des Sciences et Belles-lettres*, 1767. John considers Förster's account to be the most complete and satisfactory. John's article in vol. xxxvii of the *Deutsche Biographie*, and Formey's sketch are the sources relied upon for the facts here presented.

soul to the perservation of his temporal goods, and fled from his native country. Having exhausted his means, he engaged in military service under the Great Elector, Frederick William, in Brandenburg. His ability soon won him promotion to the office of Lieutenant-Master of the Watch, and he enjoyed the special favor of the Elector. After the battle of Fehrbellin, this old Protestant warrior retired to his estate at Zehlendorff, situated halfway between Berlin and Potsdam.

The eldest son of this military favorite was Johann Peter's father, John Elias. In his youth he had visited France, England, and Holland, and had seen most parts of his own country. On one of his journeys he visited the old family estate in Bohemia. He at that time was offered the property and office his father had abandoned if he would embrace the Catholic religion, but he refused to be bribed into apostacy. He married Marie Blell, daughter of Peter Blell, master dyer at Brandenburg, and established himself in Berlin as a grain dealer and proprietor of a brewery.

Johann Peter Süssmilch was the eldest son of these well-to-do, sturdy and honest Brandenburgers. He was born in Berlin in 1707. His parents resolved to spare no expense in procuring him an excellent education, and we gather from his biographers that young Süssmilch heartily responded to his parents' desire and eagerly embraced the exceptional advantages placed within his reach.

His early youth was spent in the village of Brandenburg, with his grandparents, the Blells. In 1716 he entered the college of Berlin, where he remained six years. At this institution he seems to have shown a strong liking for natural history. Frisch, his instructor in natural history, to better acquaint his students with the elements of the natural sciences, took his classes on short excursions to the neighboring fields and woods. We are told that on these expeditions young Süssmilch excelled all his fellows in the zeal

with which he collected stones, shells, insects, and botanical specimens. At this early age was apparently evinced that natural bent which was later to serve him so well in the collection of statistical data.

In 1724 Süssmilch attended the Anatomical Institute in Berlin, which had just been organized. At this time he was ambitious to become a physician, but in deference to his parents' wishes he left Berlin to pursue the study of law in a Latin school at Halle. Law proved distasteful, and in the meantime he had become interested in theology, and he finally persuaded his parents to consent to a substitution of theology for law.

Like many other young men, Süssmilch seems to have experienced much difficulty in making choice of a profession. Theology, however, proved agreeable to his tastes, and having definitely decided to make this profession his life work he devoted himself to it with his characteristic energy. In 1727 he was in attendance at Friedrichs-Universität, Halle, where he pursued the study of Hebrew and the related oriental languages with a zeal that endangered his health. In 1728 he went to Jena where he remained two and a half years studying theology and philosophy under the most famous teachers of the time. It was while a student at Jena that he acquired a taste for academic life, and even aspired to become the occupant of some university chair. His parents, however, would not listen to such a proposal, and his college career closed when, in 1733, he defended his thesis, *Dissertatio de cohaesione et attractione corporum*, written at Jena under the direction of Hamberger.

Before he had completed his thesis young Süssmilch had been asked to accept the position of private tutor to the eldest son of Marshal Kalckstein. The offer was accepted and, as private tutor, he remained with Kalckstein four years when, in 1736, he was made chaplain of the Kalckstein regiment.

In 1738 Süssmilch preached in the King's cabinet, and several times subsequently the same honor was accorded him. In 1740 he was offered the curacy of Ezien, but at about that time the First Silesian War broke out and he considered it his duty to march with the Kalckstein regiment. It was during this campaign that he wrote the preface to the first edition of *Die Göttliche Ordnung*. The campaign ended, the young chaplain resumed his ministerial functions, preaching first at Ezien and later in the church of St. Peter in Berlin.

In Berlin Süssmilch soon acquired an enviable reputation as a preacher and scholar. In 1745 he was admitted to membership in the Berlin Academy, and five years later another honor was paid him in his election to membership in the newly organized Supreme Consistory.

The masterpiece of his literary efforts was *Die Göttliche Ordnung*. The spare moments of his life were spent in writing, revising, extending, and defending this statistical work, the subject matter of which is sufficient evidence of the indefatigable industry of its author,

Süssmilch married at the age of thirty Charlotte Dorothy Lieberkuhn. We are assured by his biographers that his home life was exceptionally felicitous, and that he was never so happy as when in his library, surrounded by the books which he had collected at great expense. He was blessed with ten children, nine of whom with his wife survived him. He died from an attack of apoplexy, March 22, 1767, at the age of sixty.

With this brief sketch of the life of Süssmilch we pass to a consideration of the contents of his principal literary work, *Die Göttliche Ordnung*.<sup>1</sup>

<sup>1</sup> For an extended discussion of the bibliography of Süssmilch, the birth of his idea to write *Die Göttliche Ordnung*, and the various editions through which it passed, see Part iv.

II. *Süssmilch's Theory of Population as Developed in "Die Göttliche Ordnung."*<sup>1</sup>

Like the Mercantilists, Süssmilch was firmly convinced that the power, prosperity, and happiness of a state or nation largely depends upon the number of its inhabitants and upon the rapidity of their increase. Starting with this assumption, he repeatedly emphasizes it.

The Creator intended that man should multiply and fill the earth, and to this end uttered the command: "Be fruitful and multiply, and replenish the earth, and subdue it." That this command may be fulfilled, certain conditions are necessary. The number of births must, on the average, exceed that of deaths. There must be some conformity to law, or a regularity in diseases. They must be so proportioned and distributed as to bring about a proper average duration of life. It is necessary also that there be a regularity in the propagation of the two sexes.<sup>2</sup>

Süssmilch sets out to demonstrate, with more thoroughness than any of his predecessors had done, that the phenomena of birth, marriage, disease, and death are bound together in a most perfect, complete, and beautiful system. The perfection of this system (*Ordnung*) is the result of divine interference and control, otherwise it might be overturned at any moment. The striking regularities in these vital phenomena, the manifestations of which, to the casual observer, are apparently so fortuitous, furnish a strong foundation for belief in a God, who with concealed hand, binds together the various rules of this whole system in a beautiful and durable union for the attainment of His great design — that men shall constantly increase upon the earth.<sup>3</sup> As regards the generation, duration, and preservation of our lives, God is an infinite and exact arithmetician.<sup>4</sup>

<sup>1</sup> References, unless otherwise stated, are to the second edition (Berlin, 1761-62) of *Die Göttliche Ordnung*.

<sup>2</sup> Vol. i. Introduction.

<sup>3</sup> Vol. i, sect. 16.

<sup>4</sup> Vol. i, sect. 17.

The very title of the book, *Die Göttliche Ordnung*, reflects with sufficient clearness the notion that the conformities to law in social life find their explanation in divine supervision.

In commenting upon the utility of his work,<sup>1</sup> Süssmilch observes that the chief benefit to be derived from its study is the knowledge which it affords of the divine oversight of the changes to which the inhabitants of the earth are subject. "Everything is arranged according to definite numbers and proportions. Men are born and men die, but always in a certain ratio. Children are born, sons and daughters promiscuously, but without violation of the order once chosen by Providence. Men die, at first sight, irregularly as regards age, but, upon more exact observation, in accordance with fixed proportions. Now, as man contributes little or nothing to all this, and more accidental events are chimeras worthy of derision, we are strengthened in the truth that God cares for the human race."

Throughout this discussion Süssmilch is dominated by theological and teleological conceptions. The final cause of the wonderful conformities to law in the movements of population is God; the ultimate purpose in view is the increase of mankind.

Süssmilch's ideas respecting the dynamic changes in population may conveniently be grouped under three heads: (1) The increase of the human race; (2) marriage and fecundity; and (3) mortality.

1. *The Increase of the Human Race*.—Süssmilch estimated that, with liberal allowances, the population of the earth could not be over 1080 millions, while it might easily support at least 5000 millions. He therefore emphatically denies that war, pestilence, or famine are necessary to maintain an equilibrium between population and subsistence.<sup>2</sup> The actual population of the world being far short of the possible popu-

<sup>1</sup> Preface to the first edition of *Die Göttliche Ordnung*.

<sup>2</sup> Vol. ii, pp. 177, 232. Also vol. i, sect. 204.



lation, an increase of mankind is the normal and proper condition of things.<sup>1</sup>

The proportion of births to deaths is dependent upon laws of mortality and fecundity, the limits of which are so fixed by the Creator that an excess of births over deaths everywhere prevails when whole provinces are taken into account and the period observed is normal.<sup>2</sup> In cities, owing to peculiar conditions, not infrequently deaths exceed births. When, however, the observation is of an entire province or country the deaths cannot exceed the births, except during an epidemic period, or unless the country is exceptionally full of people and the opportunities for the maintenance of new families are all taken. Regarding Prussia, Sweden, and England as fairly typical countries, Süssmilch concludes, from data gathered in those countries, that the average ratio of births to deaths for an entire country is 13 to 10, or at least 11 to 10. As a natural corollary he declares that the population is not stationary but increasing, an opinion by no means universally held at that time.<sup>3</sup>

From the data at his command Süssmilch considered the general average period required for a population to double in numbers to about 100 years.<sup>4</sup> He recognizes, however, that the rate largely depends upon the conditions of time and place.

Had it not been for the devastations wrought by pestilence, war, famine, and other plagues, the world would long since

<sup>1</sup> It is interesting to note the method employed by Süssmilch to determine the number of people whom the earth might support. He estimated that an English square mile could, under proper tillage, support at least 200 inhabitants. On this assumption Europe might support 550 millions of people, whereas, from the best information available, he concluded that it contained only about 130 millions. The estimates of the actual population of the various countries of Europe and of the world were necessarily quite arbitrary, owing to the fact that enumerations of populations even in small districts were seldom made. It was therefore necessary in any attempt to obtain the population of a country to have to resort to various indirect methods. So far as we know, Süssmilch's calculations of the population of the earth were fairly good, and compare favorably with other estimates made in the 18th century.

<sup>2</sup> Vol. 1, sect. 120.    <sup>3</sup> Vol. i, sect. 140.    <sup>4</sup> Vol. i, sects. 140-146.

have been fully populated.<sup>1</sup> Of all the obstacles to increase, the pest is undoubtedly the most detrimental. Its ravages vary greatly. Sometimes one-twelfth; sometimes one-third or one-half the population of a district are struck down by it.<sup>2</sup> The mortality from the pest can be considerably modified, and the danger of its visitation lessened by proper health regulations. It is a greater menace to mankind than war, because it not only blights the tree in the twigs and branches, but also in its very roots. It not only destroys adults and breaks up marriages; it smites also children and babes.<sup>3</sup>

Süssmilch denounces war as a monster, and a stain upon reason, humanity, and christendom. It robs the state of many of its best men. Marriages are broken up by the premature death of husbands, whose widows for the most part fail to re-marry. As the two sexes are approximately equal at the marriageable age, war, by destroying large numbers of the young men, leaves many maidens unwed. Means of subsistence are rendered more difficult to obtain by the damage inflicted by war upon manufactures and commerce. Finally, war fosters pestilence and famine, two powerful checks on the increase of mankind.<sup>4</sup>

Famine is the most terrible of all afflictions, but, fortunately, its visitations are infrequent. It is much to be dreaded, however, and governments should see to it that proper storehouses of food are provided against emergencies.<sup>5</sup> The destruction of population by floods and earthquakes is slight in comparison with the mortality caused by the other enemies of mankind.<sup>6</sup>

Polygamy has given rise to eunuchism, a wide-spread custom detrimental to population.<sup>7</sup> What eunuchism is to the East celibacy is to the West.<sup>8</sup> Celibacy is to be unsparingly condemned, because it checks the increase of population, and

<sup>1</sup> Vol. ii, sect. 168.

<sup>2</sup> Vol. i, sect. 180.

<sup>3</sup> Vol. i, sect. 182.

<sup>4</sup> Vol. i, sects. 183-188.

<sup>5</sup> Vol. i, sects. 189-191.

<sup>6</sup> Vol. i, sect. 192.

<sup>7</sup> Vol. i, sects. 193-196.

<sup>8</sup> Vol. ii, sects. 197-203.

corrupts the morals. The Catholic church and standing armies are the causes of this great hindrance to the growth of population.

Süssmilch was a firm believer in governmental interference if in any way it would promote the increase of the population. The three primary aims of the state, he maintains, are the happiness, security, and wealth of its members. Population is the foundation of all three.<sup>1</sup> A ruler should learn to value his subjects. He should be interested in them not merely because they are his fellow citizens, but also because they are the tools with which the general happiness, power, safety, and wealth of the state are secured.<sup>2</sup> Rulers should therefore employ all possible means to promote population, and to remove all obstacles to its increase.

The pleasures of a people are enhanced by their being in close relation with each other. This is the reason that life in the city is preferred to life in the country.<sup>3</sup> The exchange of products, and the satisfaction of the varied needs, can be more easily accomplished when the population is compact. The more men there are in a state, who by their industry not only create the most indispensable necessities of life but also an excess, so much the more readily can the state grow in wealth and power by the exchange of the surplus for the precious metals.<sup>4</sup>

No obstructions should be placed in the way of marriage. When the proportion of inhabitants to the annual number of marriages rises, it is a sign that marriage is restricted. It is the duty of a ruler to oppose celibacy and to encourage matrimony.

Agriculture, the mainstay of a country, should be carefully fostered.<sup>5</sup> Manufactures, trade, and the arts have their great value, but they must not be exalted above agriculture. If a country is to contain the largest possible number of

<sup>1</sup> Vol. i, sect. 205.

<sup>2</sup> Vol. i, sect. 209.

<sup>3</sup> Vol. i, sect. 206.

<sup>4</sup> Vol. i, sect. 208.

<sup>5</sup> Vol. ii, chap. xv, and vol. i, sect. 221.

inhabitants no land can lie unused. The holdings must be allotted in such manner that the peasant shall have neither too much nor too little. The imperial domains and other large estates should be let to the peasants for a quit rent in produce. Economy, too, on the part of the peasants is of great importance. The land should be cultivated by oxen rather than by horses. Grain will thus be saved, and the old ox can be consumed for food. Every peasant must possess his own separate property if agriculture is to flourish, for he will labor more willingly when he knows that he is pursuing his own interest. Court and other compulsory services which are burdensome to the peasant should be abolished. The planting of fruit trees, and the keeping and culture of bees should be encouraged. Finally, Süssmilch advocates the establishment of a college of agriculture to have general oversight of agriculture, propose needed improvements, and compel the execution of them.

Manufactures, if properly conducted, promote marriage, keep money in the country, and increase the state revenue.<sup>1</sup> Unless agriculture is fully developed, however, there is danger of attempting too many manufactures. Governmental supervision is necessary to preserve the proper balance between the two.

It is fortunate for the state to have large exportations, as it is then in a position to grow ever richer in men and money. When, therefore, foreign markets have once been established strong efforts should be made to hold them by maintaining the good quality of the exports, and by keeping the prices reasonably low. Manufactures, particularly of textiles, should not be unduly encouraged in large cities where the cost of food is higher than in the country. Bounties upon newly established industries, or upon exports, may also be of advantage.

2. *Marriage and Fecundity.*—Marriage is the union of a man with one or more women for the purpose of propagating,

<sup>1</sup> Vol. ii, chap. xvi.

preserving, and rearing children. Marriage is the best means for populating the earth — best for the parents, for the children, and for the state. It affords husband and wife their best society. They mutually minister to each other's wants, lighten each other's burdens, and sweeten the adversities of life. Through the marriage relation the general welfare is best promoted, the needs of nature are best satisfied, and the offspring are best cared for. Children require longer nursing and care than the young of the lower animals. Mother and child require the protection of the father longer. For these reasons the marriage relation is the strongest bond of the state.<sup>1</sup> Marriages, too, form the basis of fecundity and the increase of mankind, and they must be sufficiently numerous to bring about an excess of births over deaths.

Fecundity may be distinguished as general and special. The general fecundity is the ratio of the annual births to the total population; the special, marital fecundity is the ratio of the legitimate births to the marriages.<sup>2</sup>

If the natural impulses of man could have free play the proportion of marriages to the total population would always be about the same. Such a state of things exists, however, only in countries or regions comparatively unpopulated. When a country is tolerably well filled with inhabitants checks to marriage arise, owing to the wise foresight of men. He who resolves upon marriage assumes at the same time duties which bind him to the maintenance of a family. If the opportunities of providing such maintenance are lacking, his desire to marry is restrained. The more difficult the acquisition of a maintenance the more obstacles are thrown in the way of matrimony, and the fewer the number of marriages contracted. If to these difficulties be added external compulsion, whereby men are restrained from mar-

<sup>1</sup> Vol. i, sect. 53.

<sup>2</sup> Vol. i, sect. 54.

riage by laws and force, then the number of persons engaging in matrimony will be still smaller. It is circumstances of this sort that cause different marriage rates in various countries and districts.<sup>1</sup>

From data gathered in 1056 villages of Brandenburg, Süssmilch found the average ratio of marriages to population to be 1 : 108. This ratio, he adds, will remain about constant so long as the old system of rural economy remains unaltered. He held Brandenburg to be so fully populated that, unless improvements were made in the methods of agriculture, marriages could not be contracted until opportunities were afforded by death.<sup>2</sup> The notes of Wargentín for England and Sweden, the accurate observations of Struyck for twenty-two villages in Holland, and the tables of Short for certain English villages, all confirmed the ratio, 1 : 108, found in Brandenburg.<sup>3</sup>

Examination of the data collected in Halle, Leipzig, Augsburg, Danzig, Berlin, Amsterdam, Zurich, Paris, Königsburg, and in the districts of Magdeburg, Halberstadt, Minden, Cleves, Pomerania, Brandenburg, and Prussia led Süssmilch to conclude that there had been a decline in the marriage rate since the beginning of the century, 1700, except in Prussia and Pomerania.<sup>4</sup>

What, he asks, is the explanation of the decline in the marriage rates of the rural districts? Are the same causes at work as in the cities, namely, a constant rise in the price of necessities, and growing extravagance in habits, which render the maintenance of a family increasingly difficult? But the peasant raises his own grain and is not extravagant and inclined to luxury like the burger. The reason for the diminishing number of marriages in the country districts must be found in the fact that the villages and market towns are, under present conditions, fully populated. Every village has its definite bounds and its definite number of farms to

<sup>1</sup> Vol. i, sect. 55.<sup>2</sup> Vol. i, sect. 56.<sup>3</sup> Vol. i, sect. 57-59.<sup>4</sup> Vol. i, sect. 72.

which belong a certain number of day laborers and workmen. If every village has the men and families that it needs there can be no new marriages. The unmarried adult people cannot marry if they wish to do so except as death makes room. In a province fully inhabited under the prevailing economic and industrial conditions only a certain number of new marriages can be annually contracted. Only so long as there is at hand unused fields can men freely follow their natural impulses and marry when inclination moves them.<sup>1</sup>

Süssmilch does not overlook the fact that the conditions of civil, political, and social life set limits to our freedom and act as checks on the natural impulses. Upon the political and social organization largely depends the ease or difficulty of acquiring the means of subsistence for a family. When a young man arrives at the marriageable age the question is raised "Whence shall I secure bread for wife and children?" If the problem is difficult to solve marriages are postponed and fecundity diminished. France is pointed out as a notable example of a country the political and social organization of which is such that the increase of the population is seriously hindered. The oppression of the Farmers-General and the steady increase in the taxes levied upon agriculture act powerfully to restrain the people from marrying and to diminish the marital fecundity. If these evil conditions are not remedied the best provinces, one-half the lands of which are already uncultivated, must eventually be depopulated.<sup>2</sup>

Cheap means of subsistence have a great influence on marriage. If the price of necessities rise while wages remain the same many laborers are kept from marriage.<sup>3</sup> In cities, so large as not to be able to get food near at hand to support their inhabitants, provisions are likely to be dear. For this and other reasons it is better that cities be numerous and small than few in number and large.<sup>4</sup>

Taxes may easily become a serious hindrance to marriage. From the maxim that necessity is the mother of industry and

<sup>1</sup> Vol. i, sect. 72.<sup>2</sup> Vol. i, sect. 76.<sup>3</sup> Vol. i, sect. 223.<sup>4</sup> Vol. i, sect. 224.

useful inventions has come the opinion held by some that industry, agriculture, and trade are fostered by keeping taxes high. Beggars are not inventors. If men are to achieve the most of which they are capable they must not be taxed until they lose all hope of bettering their condition in the future.<sup>1</sup>

Luxury, too, is an obstacle to marriage.<sup>2</sup> Splendor, wantonness, and extravagance begotten by pride and accompanied by immodesty and vanity increase the cost of living and place a serious check on marriage. Luxury gives rise to a large number of servants who necessarily remain unmarried. Besides impoverishing individuals, it weakens the state by encouraging unnecessary importations. The children of parents who indulge in luxury are seldom trained in good counsel and solid thinking. A prince must deal with his subjects somewhat as parents deal with their children, limiting and regulating their expenses. Süssmilch even thought it might be useful to divide the people into classes, according to wealth, dignity, and position. Regulations could then be made by a body of censors respecting the expenditures of each class for dress, food, servants, etc.

In order that the best results may obtain, the marriage bond should be made durable. Divorces should only be granted for the weightiest reasons.<sup>3</sup> If divorces are granted unreservedly, intrigues, jealousies, and crimes, harmful to the morals, and opposed to the increase of population, are likely to be unlimited. The ruler should strive to place marriage on a high plane, and should discourage and restrict in every possible way polygamy, harlotry, and divorce.

In his zeal to promote the rapid increase of population, Süssmilch goes so far as to assert that it is the duty of the ruler to see to it that those who are capable of marrying and supporting a family do so. As a punishment for men who

<sup>1</sup> Vol. i, sect. 225.

<sup>2</sup> Vol. i, sect. 229 ; also vol. ii, chap. xvii.

<sup>3</sup> Vol. i, sect. 231.



obstinately remain bachelors, their property should be confiscated and applied to a marriage fund for the assistance of the married poor.<sup>1</sup>

It is the duty of a ruler to make all possible provision for the preservation of the lives of his subjects, and also to make his government so attractive as to keep them in his country. Liberty and property, justice, freedom of conscience, and religious tolerance are necessary if the subjects are to be inspired with a desire to remain in their fatherland.

As the changes in population depend so largely upon the social and political organization of the people it follows that state-craft should pay special attention to these matters and endeavor exactly to determine the proportion of marriages annually contracted to the total population, and seek if by any means the proportion can be raised. The wisest, truest servants of the state are those who seek to make it yearly more populous, to clear away all obstacles to marriage, to grant men freedom, and to make possible the satisfaction, in orderly ways, and particularly through marriage, of the natural impulses implanted in them by the wisdom of the Creator. Every marriage prohibited, every child less brought into the world, weakens the future power of the state. They are bad counsellors who think to enrich princes through the increase of taxes and the enhancement of the prices of the first necessities of life. By this short-sighted policy the foundation of the wealth of the country is destroyed for a temporary revenue. That prince acts wisely who seeks the enlargement of his income in the reasonably promoted increase of his subjects. If human wisdom and virtue are the main-springs of government, a ruler promotes his own interests, and advances the prosperity of his state, when he acts in accordance with the divine purpose, which aims at the fecundity and increase of mankind.<sup>2</sup>

<sup>1</sup> Vol. i, sect. 233.

<sup>2</sup> Vol. i, sect. 78.

Taking into account an entire country, there are about four children to every marriage. Now, so far as the natural powers are concerned, the fecundity might be much greater. The bearing period of women is at least twenty-five years (15 to 40), and allowing for only one child every two years, twelve children per marriage are possible under favorable circumstances. Why is the fecundity so comparatively weak? Süssmilch distinguishes two classes of causes. First, those which lie outside human control, and secondly, those due to man's wilfulness — irregularities, and dissoluteness.<sup>1</sup>

In the first class of causes are the following: Often one of the wedded persons is naturally infertile. Sickly, frail, consumptive parents reduce the marital fecundity. The premature disruption of the marriage by the death of one party, particularly when the other fails to remarry, as widows generally do. The unnatural marriage of young girls to old men, and of young men to middle aged widows. Such marriages are unreasonable, sinful, highly detrimental to the increase of population, and worthy of the severest suppression.<sup>2</sup> Süssmilch even goes so far as to recommend a law that would forbid the marriage of young people to those past the reproductive age. Exceptions might be made in certain cases, but a good dowry should be required from the exempted couple to go toward the assistance of two or three poor people who could thus be placed in a position to make good the damage done the state by the unnatural marriage.

Late marriages also contribute to the diminished marital fecundity. These, however, are largely dependent upon the civil and political organization of society, and are not to be avoided if the country is fully peopled and the opportunities for acquiring a maintenance are all taken. Too early marriages are also opposed to a high fecundity.

In the second class of causes are the following: Debauchery among the youths. The fear and anxiety of mothers

<sup>1</sup> Vol. i, sect. 89.

<sup>2</sup> Vol. i, sects. 90, 91.

who dread the dangers of childbirth, a dread which might largely disappear if provision were made for a larger number of skilful midwives and doctors. The fear of large families, and anxiety as to the burden of maintaining them, tempts many men to remain single or, if married, to possess but few children. Finally, the fecundity is diminished by the long nursing of children by the mothers.<sup>1</sup>

Does any one people, country, or planet have a natural advantage above all others in respect to marital fecundity? In opposition to writers, like Machiavelli and Montesquieu, Süssmilch answers the question in the negative. Human nature he holds to be everywhere the same. Fecundity depends not upon the climate *per se*, nor upon a particular race or country. Freedom, easy maintenance, and virtue are the three essentials to a high marital fecundity.<sup>2</sup>

It is highly important that statesmen have a knowledge of the ratio of births to marriages. This is a state-barometer, and in it is reflected the true gains and losses in the wealth and power of the state.<sup>3</sup>

Süssmilch was not the discoverer of the fact that, on the average, more boys are born than girls. John Graunt, an Englishman, had observed this phenomenon as early as 1662.<sup>4</sup> Süssmilch, however, had as a working basis more data than his predecessor. He finds that when large numbers are observed, on the average, 104 or 105 boys are born to every 100 girls,<sup>5</sup> an excess somewhat smaller than that stated by Graunt. Süssmilch regards this law as fixed by the Creator for the purpose of securing the increase of mankind in the most rational way, namely, through monogamous marriage. The excess of boys over girls at birth is necessary in order that the two sexes may be approximately equal at the marriageable age since, in the early years of life, the death rate for males is higher than for females, largely owing to

<sup>1</sup> Vol. i, sects. 92-95.

<sup>2</sup> Vol. i, sect. 98.

<sup>3</sup> Vol. i, sect. 103.

<sup>4</sup> Graunt, *Bills of Mortality*, chap. viii.

<sup>5</sup> Vol. ii, sect. 409.

the more severe conditions of life to which the former are exposed.<sup>1</sup>

The opinion generally accepted had been that the greater mortality among males was just sufficient to bring about an exact equilibrium of the two sexes at the marriageable age. Süssmilch modifies this view. He concludes that the women are slightly in excess at that age.<sup>2</sup> For a long time this phenomenon was a riddle to him, but at last he found an explanation of the apparent inconsistency in the fact that more widows than widowers fail to re-marry. It is more difficult for a widow to get a second husband than for a widower to find a second wife. The widows who re-marry are to the widowers who re-marry about as four to five.<sup>3</sup> The excess of females at the age of maturity is, therefore, serviceable as it allows widowers to practice *Polygamia successiva* and re-marry, whereas they could not or would not marry a widow with several children.<sup>4</sup>

Polygamy, or *Polygamia simultanea*, Süssmilch looks upon as a sin and injustice. Owing to the approximate equality of the two sexes at maturity, the possession of several wives by one man must, if the practice is at all general, deprive some of his fellows of the enjoyment of married life.<sup>5</sup> If the proportion of the sexes were different, polygamy might come to be the normal marriage relation. If there were twice as many women as men in the world, polygamy would not be a sin; under such circumstances, the practice of polygamy would even be a duty.<sup>6</sup>

3. *Mortality*.—In his discussion of deaths, Süssmilch attempts first to determine the average annual number as compared to the total population.<sup>7</sup> This ratio of the annual deaths to the total population he calls the standard (*Mass*) of mortality. That this standard may be as typical as possible, it is sought in that element of the population least removed from natural conditions; that is, in the healthy,

<sup>1</sup> Vol. ii, sect. 409.<sup>3</sup> Vol. ii, sect. 429.<sup>5</sup> Vol. ii, sect. 434.<sup>7</sup> Vol. i, chap. ii.<sup>2</sup> Vol. ii, sect. 423.<sup>4</sup> Vol. ii, sect. 430.<sup>6</sup> Vol. ii, sect. 435.

robust, and industrial rural folk. From data gathered from 1056 villages of Brandenburg, for a six-year period (1743–48), Süssmilch finds the average ratio to be one death to every forty-two or forty-three inhabitants, these six years being exceptionally free from epidemics. The average ratio for mixed years (1739–48), including epidemic years, was 1 : 38, or 1 : 39. In twenty small cities of Brandenburg the average ratio in 1738 was 1 : 37. In large and populous cities, and in cities where a large amount of money circulates the death ratios are considerably higher, ranging on the average from 1 : 24 to 1 : 30. The final outcome of the investigation is that the mortality among the country folk in mixed years is, approximately, 1 : 40 (25 per 1000); in small cities, 1 : 32 (31 per 1000); in larger cities, like Berlin, 1 : 28 (36 per 1000); and in the largest cities, like London and Rome, 1 : 24, or 1 : 25 (40 per 1000). In whole provinces, urban and rural communities reckoned together, the average ratio of deaths to population is 1 : 35, or 1 : 36 (29 per 1000.).<sup>1</sup>

From this comparison of deaths and population Süssmilch draws five conclusions.<sup>2</sup> First, nature and the powers of nature are everywhere the same, and, therefore, the dissimilarity in the duration of life, as between different groups of population, is to be attributed to unlikeness of customs and diets. Secondly, localities separated geographically but under approximately similar conditions in other respects are comparable as regards mortality if the periods of time observed are identical. Thirdly, other circumstances equal, where the number of deaths is relatively large the population may be regarded as relatively large. If the number in one locality is twice that in another, under similar conditions, the population of the former may be considered as twice that of the later. Fourthly, the mortality of cities is not comparable with that of provinces, because the rules of mortality

<sup>1</sup> Vol. i, sect. 35.<sup>2</sup> Vol. i, sects. 38–42.

for cities, owing to various reasons, are quite different from those applicable to whole provinces. Lastly, in mortality there is something constant and universal. All ages, sexes, and diseases must be definitely proportioned to each other to bring it about that in a province one person annually dies of every thirty-six.

The causes assigned by Süssmilch in explanation of the high mortality in cities may be classified as subjective and objective. As compared with the rural population, the morals of the city inhabitants are more corrupt, their manner of life more luxurious, and their cares and passions greater. The higher morality of city children as compared with that of children resident in village and country is largely due to their weaker constitutions, and the negligence of their nurses who seldom are their mothers. Among the objective or external causes is the denser and more impure air of the cities. Contagious diseases spread there more rapidly than in the country, owing to the denser population, and to other conditions favorable to disease. The apparent mortality of cities is also heightened somewhat by the death of many strangers who, as temporary residents, die while inmates of hospitals, orphan asylums, and foundling houses. Wealth, too, is characteristic of cities, but wealth is the mother of poverty and causes many indigent persons.<sup>1</sup> Wealth is acquired through commerce and manufactures carried on by individuals who themselves almost never become rich and who are thrown into the deepest misery by famine, a war, or an industrial crisis. The poor are shamefully neglected in the cities. When charitable funds are provided they are quite insufficient to meet the needs of the indigent. The state thus loses many subjects whose value would repay a hundred fold the expense of preserving them.

Great cities, because of their high mortality, are not an advantage to the human race. Large cities are a real evil,

<sup>1</sup> Vol. i, sect. 50. *Der Reichtum ist eine Mutter der Armuth, und er macht viele Durftigen.*

and the damage they inflict upon the state is almost, if not quite, equal to that done by the pest. Cities are a necessary evil, which, while not curable, can be mitigated. Rulers should not strive to bring about an excessive growth of population in one or a few cities; they should endeavor to turn the urban migrants into many cities, and thus bring about a more equitable and harmonious distribution of the population. Morals, too, should be more strictly guarded in the cities, for although police regulations can instil no loathing for dissoluteness, nor make the people more virtuous, yet they can place obstructions in the broad avenues to vice and thus preserve many lives.<sup>1</sup>

In deaths by ages there is presented a most beautiful and perfect regularity.<sup>2</sup> The proportions existing between deaths at various ages and the total deaths seem to be little influenced by differences in the mode of maintenance among different peoples.<sup>3</sup> Though the causes of death are so multiple and various, yet all unite in the attainment of one firmly fixed purpose. All the different diseases have their definite limits and are under the control of the invisible hand of the Infinite, by virtue of which they must deliver their fixed number to the ordered total of deaths at every age. Fevers are universal diseases, but only so many die of the fever as is necessary to make full the quota of deaths for every age period. Where apparently there is the greatest confusion and irregularity, in reality everything moves harmoniously. All the numbers are proportioned to one another, the proportions are constant, they are approximately the same in all countries, and, what is more remarkable, all these proportions are brought about by a multitude of causes all diverse and in themselves subject to change.

When single years are compared great divergences are likely to appear in the deaths by ages, but the harmony in the proportions is disclosed when large numbers extending

<sup>1</sup> Vol. i, sect. 52.    <sup>2</sup> Vol. ii, chap. xxii.    <sup>3</sup> Vol. ii, sect. 436.

over a period of several years are observed. The larger the numbers observed the more constant are the proportions.

A comparison of deaths by ages between such different groups as the nuns and Benedictine monks of Paris, the inhabitants of the Brandenburg villiages and of the Swedish provinces showed an astonishing agreement.<sup>1</sup> In this respect the statistics of Paris, Breslau, and Brunswick were also strikingly similar.<sup>2</sup>

From a comparison of several large and small cities, Süssmilch concluded that deaths were more numerous in the large cities in the age groups from twenty to thirty years, and in the small cities for the age groups above fifty years.<sup>3</sup> These facts demonstrate that the large cities lose an excessive number of men at the most useful period of their lives.

On the average, one-half of the people born into the world die before they attain to the age of twenty years. Mortality is high in early childhood, and it is highest during the first week of life. In the second year the vital powers are three or four times as great as in the first year. In the third year only one-half as many die as in the second. The decline in mortality continues until about the fifteenth year, when only two of every 1000 annually die. The mortality increases again about the twentieth year, the period of life when men begin to engage in severe labor, and are inclined to indulge in evil habits. Women, too, at this age are subject to all the dangers attendant on early womanhood.<sup>4</sup>

Süssmilch presents a table showing, first, how many die at every age of life, taking as a starting point 1000 births and assuming that 1000 are born and 1000 die annually; secondly, how many of the original 1000 remain alive at every age period; thirdly, how many of all ages are living in every age group; and, fourthly, how many die at every age period as

<sup>1</sup> Vol. ii, sects. 440, 441.

<sup>3</sup> Vol. ii, sect. 448.

<sup>2</sup> Vol. ii, sect. 442.

<sup>4</sup> Vol. ii, sect. 457.



compared with the living.<sup>1</sup> Recognizing that this table does not represent the true state of affairs, Süssmilch yet thinks that it shows certain facts fairly well; as, for example, the probability of life, and the number of persons living within certain age limits. It furnishes also a basis for a rough estimate of the number of married persons and the number of children per marriage. He estimates that nine marriages, the parties to which are aged from 20 to 40, produce annually two children, or one such marriage gives one child every four and one-half years.<sup>2</sup>

From the data at his command, Süssmilch concludes that the duration of life is longer for females than for males; and that the power of females to sustain life is apparently greater at almost all ages of life than that of males. Struyck<sup>3</sup> and Kersseboom<sup>4</sup> had demonstrated this to be true for Holland.

The discussion of deaths by diseases is unsatisfactory and for good reasons.<sup>5</sup> The data relating to the subject were very limited in amount, and the nomenclature of diseases, at the present imperfect and lacking in uniformity, was then quite undeveloped. Süssmilch himself was fully aware of the difficulties in the way of a satisfactory treatment of the subject, and his conclusions are given as tentative. The true order or system of deaths by diseases can, he says, only be represented after careful observations of diseases and the collection of statistics for entire provinces and for a long period of years.<sup>6</sup> He thinks, however, the conclusion warranted that each disease has, as it were, its fixed quota for the grave.

From tables for London, certain small cities of England, Danzig, and Berlin, Süssmilch considers spring to be the most dangerous season of the year, and May the month of largest mortality. Summer and autumn are the most health-

<sup>1</sup> Vol. ii, sect. 461.

<sup>3</sup> Vol. ii, sect. 477.

<sup>5</sup> Vol. ii, chap. xxiv.

<sup>2</sup> Vol. ii, sect. 466.

<sup>4</sup> Vol. ii, sect. 478.

<sup>6</sup> Vol. ii, sect. 518.

ful seasons. He is satisfied with the mere statement of fact, and leaves the causes of these phenomena to the doctors.<sup>1</sup>

The foregoing is a brief review of Süssmilch's most important ideas on the subject of population. In addition there are a few points touched upon which, perhaps, deserve notice. One chapter is given to a discussion of life annuities and tontines.<sup>2</sup> This chapter is scarcely more than a summary of the results obtained by Déparcieux in a work published in 1746.

Süssmilch performed an important service in bringing together information of much value from the view point of life insurance. While his data were entirely inadequate for the construction of a completely scientific life table, they seem to have had a practical application for a number of years, especially in Germany. In the second volume of the third edition (1765) of *Die Göttliche Ordnung* was presented a table showing the probability of living at every age for the kingdom at large (Prussia). "This table," says Walford, "was generally used in Germany during the last century (18th)." From this table was calculated the values of single and joint-life annuities for the Institution of Widows in the Duchy of Oldenburg, also for another institution of the same kind in Hamburg. "This," says Walford "was the first German mortality table, deduced from German data, and used in Germany."<sup>3</sup>

Dr. Price was acquainted with *Die Göttliche Ordnung*, and in the second edition of his *Reversionary Payments* (1772) included a table "which I have formed from a register in Süssmilch's works of the ages at which the inhabitants of a country parish in Brandenburg died." There was also included a table showing the probability of life at Berlin formed from data contained in *Die Göttliche Ordnung*.<sup>4</sup> In the sixth edition of his *Reversionary Payments*, Dr. Price

<sup>1</sup> Vol. ii, sects. 529-535.

<sup>2</sup> Vol. ii, chap. xxiii.

<sup>3</sup> Walford, *Insurance Cyclopaedia*, vol. v, p. 312.

<sup>4</sup> *Ibid.*, p. 313.

refers to "the ingenious Süssmilch,"<sup>1</sup> and adds, "that the tables in Süssmilch's book were made the basis of all the computations in Germany of the values of payments dependent on lives."<sup>2</sup>

Süssmilch's methods of calculating life probabilities were faulty, but with all the faults, his data, for lack of better, served a useful purpose in the early history of life insurance.<sup>3</sup>

Another chapter in *Die Göttliche Ordnung* is given to the discussion of the question, Is the Christian religion detrimental to the increase of population?<sup>4</sup> Montesquieu, in his *Persian Letters*, had contended that the population of Europe had decreased since Cæsar's time, and that the decrease had been chiefly due to the spread of Christianity and Mahometanism, religions less favorable to the increase of population than those which they replaced.<sup>5</sup> Süssmilch found it an easy task to expose the fallacies in Montesquieu's argument and to establish a strong case in support of Christianity as a religion more favorable to the increase of mankind than the religious systems which the Romans had in antiquity.

Still another chapter is devoted to a consideration of the question whether small or large states are to be preferred from the point of view of population. Süssmilch concludes that the size of the state is of much less importance than the industrial, economic, and social condition of its people.

### III. Süssmilch's Place in Statistical Literature.

The discovery of the fact that vital phenomena conform to laws when large numbers are considered is to be attributed to an English writer of the seventeenth century, John Graunt, whose book entitled *Observations on the Bills of Mortality* appeared in 1662. A comparison and criticism of the baptismal and death registers for the city of London for the years

<sup>1</sup> *Reversionary Payments*, 6th ed., vol. ii, p. 69.

<sup>2</sup> *Ibid.*, p. 450. See also vol. i, pp. 133-136.

<sup>3</sup> Cf. Westergaard, *Théorie der Statistik*, p. 264.

<sup>4</sup> Vol. ii, chap. xviii.

<sup>5</sup> *Persian Letters*, Nos. 108-110.

1629-61 led Graunt to conclude that the two sexes are nearly equal in numbers; that fourteen boys are born to every thirteen girls; that the ratio of births to deaths is quite uniform; and that population can be estimated if the number of deaths is accurately known.

Graunt was followed by Petty, who, in his chief work of 1676 on *Political Arithmetick*, endeavors to present a picture of the population and industries of Great Britain, Holland, Zealand, and France.

Among other English writers on population of about this period were Gregory King, who, in 1696, calculated the population of England from the hearth tax, levied in 1690 on 1,319,215 houses; and Edmund Halle, who, in 1693, made a report on the average expectation of life for each age, the basis of the calculations being tables drawn from the records of births and funerals in the city of Breslau.

Süssmilch was led to investigate the subject of population through a curiosity aroused by the remarkable conclusions reached by his English predecessors. *Die Göttliche Ordnung* is the result of an attempt to make a more detailed and elaborate analysis of population than the Englishmen had done.

Süssmilch lays relatively more emphasis upon the regularities which prevail in vital phenomena than had the previous writers. His main purpose is to determine the casual relations and conformities to law in the phenomena of births, marriages, and deaths when population masses are observed. His chief interest centers in the *Ordnung*, which is observable in the changes to which the human race are subject. By *Ordnung* he means the uniformity which prevails in the co-existence and sequence of vital phenomena. *Ordnung* with Süssmilch is used to express the same thing that is now commonly designated by the German words *Gesetze* and *Gesetzmässigkeit*.<sup>1</sup>

<sup>1</sup> Süssmilch at times used the word *Gesetze* interchangeably with *Ordnung*. See *Die Göttliche Ordnung*, vol. i, p. 51.

In the emphasis placed upon the *Ordnung* which exists in the movements of population, and in the merely incidental importance which he attaches to statistical data as descriptive of the condition of a state or states, Süssmilch is widely separated from the school of statisticians best represented, perhaps, by Achenwall, whose chief work was first published in 1749.<sup>1</sup> The Achenwall conception of statistics makes the analysis of population important mainly because a knowledge of the number and condition of the population furnishes a valuable clue to the power and general welfare of the state. In this sense statistics is a description of the state for administrative and political purposes. Süssmilch deals only with statistics of population, but in the field thus limited he attempts to make as minute an analysis as the data at his command will permit. The data are gathered from every available source, and they are arranged, not primarily with a view to obtain a knowledge of the condition of any country or countries, but for the purpose of solving questions relating to the causal interdependence of certain events in human life.

The second edition of *Die Göttliche Ordnung* may be regarded as bringing to a successful close the first period in the history of population statistics.<sup>2</sup> The Belgian, Quetelet (1796-1874), was the next prominent writer to work along the lines laid down by the Englishmen of the seventeenth century; by Struyck and Kersseboom in Holland in the middle of the eighteenth century; and by Süssmilch, in Prussia.<sup>3</sup> The main purpose with both Süssmilch and Quetelet is to investigate the conformities to law in social life.

<sup>1</sup> *Abriß der neuesten Staatswissenschaft der Heutigen vornehmsten europäischen Reiche und Republiken.*

<sup>2</sup> Knapp, *Théorie des Bevolkerungs-Wechsels*, p. 55.

<sup>3</sup> Curiously enough Quetelet seems not to have been acquainted with Süssmilch's work. Quetelet in his writings refers but once to Süssmilch (*Social Physics* (1835), vol. i, p. 198), and that reference was evidently taken from Sadler's *Law of Population*, vol. i, pp. 197-201. In the beginning (p. 91) of his book, *Physique Sociale*, Quetelet says: "L'homme naît se developpe et meurt d'après certaines lois qui n'ont jamais été étudiées dans leur ensemble ni dans le mode de leur réactions mutuelles." From this sentence Wagner thinks that Quetelet had no knowledge of Süssmilch's *Die Göttliche Ordnung*. (Wagner, *Statistik* in Bluntschli's *Deutsche Staats-Wörterbuch*, vol. x, p. 429.)

They differ radically in the explanation assigned for the appearance of these regularities in phenomena so complex. Süssmilch thinks the explanation is to be found in a divinity; Quetelet reduces the laws to mathematical formulas.\* The advance from Süssmilch to Quetelet is the advance from a theological, teleological to a mathematical, physical conception of the conformities to law in social life. Quetelet demonstrates with even more thoroughness than Süssmilch that large numbers are essential in any determination of the regularities in vital and social phenomena. Quetelet's Budget,<sup>1</sup> however, recalls Süssmilch's "Zins zur Sterblichkeit."

A serious obstacle to careful investigation which all writers on population of the seventeenth and eighteenth centuries encountered was the lack of accurate enumerations of population. Throughout the seventeenth century, when enumerations were taken at all the large countries, they were generally limited to a single district, or to certain cities. If the population of the whole country was required it was estimated, various methods being employed. In the eighteenth century some advance was made, particularly in France and Prussia. Under Frederick the Great, beginning in 1748, enumerations of population were quite regularly made in Prussia.

In his calculation of typical averages, Süssmilch relies almost entirely upon the number of the living inhabitants enumerated in Berlin for the years 1747-1755,<sup>2</sup> and in Brandenburg for the year 1748.<sup>3</sup> These seem to have been the only actual enumerations upon which he based his calculations.

The main sources from which were derived the data contained in *Die Göttliche Ordnung* were the church registers

<sup>1</sup> "Il est un budget qu'on paye avec une régularité effrayante c'est celui des prisons, des bagnes et des échafauds; c'est celui-là surtout qu'il faudrait s'attacher à réquie." *Physique Sociale*, vol. i, p. 96.

<sup>2</sup> *Die Göttliche Ordnung*, vol. i, p. 263, and appx. p. 21. Bielefeld criticised the accuracy of the Berlin enumeration of 1747, but Süssmilch (vol. i, pp. 262-264) gives a very good answer to the criticism, maintaining that the count was taken with all reasonable accuracy.

<sup>3</sup> *Die Göttliche Ordnung*, vol. i, appx. pp. 2-8.

of various cities, villages, or rural districts in Prussia, England, Holland, Sweden, France, and Italy. The English lists were fairly good from the close of the sixteenth century; the French lists from the middle of the seventeenth century; and the Prussian lists from the close of the seventeenth century. All these early lists were generally kept by the church, though often with the sanction and authority of the state. They were, therefore, records of baptisms, marriage ceremonies, and burials. Such lists are not as satisfactory as the data obtained by civil registration, where the purpose is to record the fact quite regardless of any ceremony which may or may not be connected with it.

When we consider how comparatively meagre were the data at Süssmilch's command, and how unscientific were the methods then employed to collect and compile statistics of population, it is really remarkable how many results he was able to obtain by skillful combination and keen analysis of his materials.

The principal statistical propositions advanced by Süssmilch must be regarded as fundamental for population statistics even in our day.<sup>1</sup> While his conclusions are generally to be accepted as true, he at times shows a tendency to interpret his data in too broad terms. He occasionally generalizes when the data upon which his argument rests are insufficient to warrant generalization. A striking example of this tendency is his assertion that, given the number of deaths, the population can be obtained by making use of certain multipliers which are assumed to represent the number of inhabitants to every death. From a calculation of the death ratios of Brandenburg, where the population was known from the enumeration of 1748, Süssmilch found that the population bore certain relations to the number of deaths, the ratios varying somewhat according as the population was for large cities, small cities, or rural districts. Having found

<sup>1</sup> Wappaus, *Studium in Statistik*, vol. i, p. 6.

these proportions, he hastily assumes that, approximately, the same proportions hold true everywhere, and that it is only necessary to know the number of deaths annually occurring in a given locality to calculate the number of its inhabitants. It is obvious to anyone at all familiar with statistics that the number of deaths taken by itself would seldom prove a trustworthy index of the population of a country.

In his treatment of the statistics of marriages and births, and in his discussion of marital fecundity, Süssmilch relies least upon his predecessors. In the discussion of these subjects considerable allowance is made for the influence exerted by customs and economic conditions on the number of marriages and births, and on the average number of births per marriage.<sup>1</sup> The discussion of deaths and diseases, from this point of view, is much less satisfactory.<sup>2</sup>

Regarding *Die Göttliche Ordnung*, as a whole, its greatest fault, from a scientific standpoint, is its theological setting.<sup>3</sup> Even this fault may be largely excused, however, when we reflect that Süssmilch was a preacher. It is quite probable that if he had not felt that, as a preacher, he was bound to furnish some plausible excuse for meddling with economic and political questions, much less space would have been given to theological considerations.

Süssmilch's theory of population was undoubtedly largely influenced by the special circumstances of his own time and country. Prussia, in the eighteenth century, was rapidly extending her territory and developing her industries, and this expansion was particularly rapid during the reign of Frederick the Great (1740-86). As a youthful militant state, Prussia needed a larger population. Frederick's policy

<sup>1</sup> *Die Göttliche Ordnung*, vol i, sect. 99.

<sup>2</sup> *Ibid.*, vol. ii, sects. 441, 517.

<sup>3</sup> Süssmilch fell into the error that is noticeably incident to physical speculation generally in its pre-scientific stages. As a careful writer has well said, "it is observable how prompt is the conception that an apparent uniformity in the co-existences and sequences of phenomena constitutes an objective expression of a Divine Idea." T. E. Young, *On Centenarians*, p. 30.



recognized this necessity. He held out every inducement to attract foreigners to his country. It is estimated that during the period from 1740 to 1756 over 100,000 colonists were introduced into the several provinces. Special incentives were offered to attract skilled artisans, and to persuade immigrants to settle upon Prussian lands. The system of colonization pursued by Frederick "had mainly in view the recovery of lands on which nature had not smiled; which the elements had laid waste; or which bad husbandry had left in neglect."<sup>1</sup>

Frederick's ideas respecting population, and the economic means best adapted to secure the greatest prosperity of the state, coincide with those advanced by Süssmilch. Encouragement of immigration, and a rigorous protective policy were parts of a scheme which sought to increase the fighting strength and tax-paying power of the state; to enlarge the annual production of grain, and thus lessen the dependence of Prussia on her neighbors; and to encourage manufactures with the object of securing a favorable balance of trade.

Prussia needed a large revenue. Frederick's policy was to secure an increase in the state revenues, not by levying new taxes, or by raising those already imposed, but by increasing the amount of taxable property and the number of tax-paying subjects.

Süssmilch, with an eye to the conditions prevailing in Prussia, naturally enough, gave an exaggerated importance to all measures which might artificially stimulate the increase of population. In this connection it may be noted that Malthus, too, committed the same error, though his conclusions were quite the opposite of those reached by Süssmilch. Malthus, impressed with the conditions prevalent in the England of his day, formulated the principles of population in terms which exaggerated the strength of the tendency for a redundant population to arise. The situation in England

<sup>1</sup> Tuttle, *History of Prussia*, vol. iii, p. 95.

at the time Malthus wrote was peculiar. It was an age of transition from the system of small industries to the modern system of large industries. Additions to the food supply were procured with great difficulty, while population was increasing rapidly under the stimulus of the newly-expanding industries, supplemented by the unwholesome encouragements of a vicious system of poor relief. "On every hand it was obvious that population was increasing; and that the numbers which were added were brought into the world without any real attempt to provide, by additional effort, for their subsistence."<sup>1</sup>

It is interesting to contrast the standpoints from which Süssmilch and Malthus regarded population, both being influenced by the special environments in which they found themselves. Süssmilch was thoroughly convinced that no danger could arise from an increase of population. In his view danger rather lurked in the unconcern of rulers to the proper encouragement of the increase of their subjects. Süssmilch held that population was nowhere too large but everywhere too small. He continually emphasizes the advantages which accrue to those countries which encourage the increase of their inhabitants. While he recognizes that the means of subsistence set an ultimate limit to population, and that checks to population often occur, owing to inferior methods of agriculture, long before the ultimate limit is reached, yet he always insists, not that the increase of population in such instances should be discouraged, but that every possible effort should be made to improve the methods of agriculture, and thus provide for a further growth of population.

Malthus, like Süssmilch, favored large populations, but he saw no necessity for encouraging the increase of population under any circumstances. In his view the tendency of popu-

<sup>1</sup> Cunningham, *Growth of English Industry and Commerce in Modern Times*, pp. 562-564.

lation to increase is so strong that it requires to be curbed rather than stimulated. Unless the conditions are special, as in a period just subsequent to war, or in a new country, population is always sure to be as large as is desirable under the circumstances of time and place.

To put the contrast between the standpoints of Süssmilch and Malthus in a word, Süssmilch favored removing all checks to the increase of population, and making every possible provision for its promotion, while Malthus was thoroughly convinced that checks to population are necessary and always in operation, and that the question is not how to remove them, but how to make such a selection of them as will result in the production of the least misery and vice.

Süssmilch, as we have seen, emphatically denies that wars, plagues, or famines are necessary to maintain an equilibrium between population and means of subsistence. While it cannot be said that Malthus favors wars, plagues, or famines, he does seem to look upon them as necessary checks to population in certain stages of civilization. As society advances ravaging epidemics become less frequent, other milder checks being powerful enough to prevent a redundant population. With the further progress of civilization war, too, abates. As these positive checks gradually cease to operate, the preventive checks, generally involving less misery, act more powerfully. The conclusion is that the preventive check which involves restraint from marriage, unaccompanied by irregular gratifications, is the one best adapted to regulate population with the minimum of vice and misery.<sup>1</sup>

One other illustration may serve to make clear the distinction between the views of Süssmilch and Malthus. Süssmilch favored the encouragement of matrimony, and considered it one of the principal duties of government to increase the number of marriages. He thinks that a statesman would be deserving of a high reward if he could increase

<sup>1</sup> Malthus, *The Principle of Population*, 7th ed., p. 262,

the number of marriages from the proportion of 1 to 120 or 125, to the proportion of 1 to 80, or 1 to 90.<sup>1</sup> Malthus emphatically denies the utility of applying any stimulus with a view to promote marriage. "The natural tendency to marriage is in every country so great that, without any encouragements whatever, a proper place for a marriage will always be filled up. Such encouragements, therefore, must either be perfectly futile, or produce a marriage where there is not a proper place for one; and the consequence must necessarily be increased poverty and mortality."<sup>2</sup>

This is simply one example illustrating the firm stand taken by Malthus against the application of any artificial stimulus with a view to increasing population.

Malthus was acquainted with *Die Göttliche Ordnung*, but there is no evidence that his views were influenced by it. When he wrote his original essay in 1798 he evidently had not seen Süssmilch's book, for extracts from a table by Süssmilch were obtained second-hand from one of Dr. Price's notes.<sup>3</sup> In the later editions of his work Malthus frequently refers to Süssmilch's book, upon which he largely drew for statistical data respecting the condition of the populations of middle Europe.

Süssmilch and Malthus may be said to represent the poles between which opinion respecting the increase of population has fluctuated. Opponents of Malthus point to France as a striking example of the results of Malthusianism. In that country the natural growth of population has been for some years practically *nil*. While the supporters of Malthusianism hold that this condition of affairs is representative of a high state of civilization, accompanied by large and generally diffused prosperity, there are not a few Frenchmen who look upon the abnormally low birth rate in France as an evil which ought to be remedied, if necessary by state action.

<sup>1</sup> *Die Göttliche Ordnung*, vol. i, p. 152.

<sup>2</sup> *The Principle of Population*, 7th ed., p. 159.

<sup>3</sup> Malthus, *Essay on the Principle of Population*, 1st ed., p. 114.

A high birth rate is considered by this class of thinkers essential as a measure for national defence. It is the Süssmilchian idea as opposed to the Malthusian doctrine.

In conclusion it may be said that *Die Göttliche Ordnung* must be regarded as an important contribution to the literature of population statistics. It is important not so much because of originality, though considerable originality is displayed, particularly in the treatment of marriages and births, but rather because it is the first complete study of population for its own sake. It stands as the first systematic compend of facts bearing upon the many complex questions connected with the static condition and dynamic changes of population.

#### *IV. Bibliography of the Writings of Johann Peter Süssmilch.*

A list of the writings of Süssmilch may properly be considered an essential supplement to the preceding sketch of his life.<sup>1</sup> They indicate the intellectual achievements of the man from 1732, the date of the publication of his thesis, to 1765, when, two years before his death, he published his second and last revision of the work to which he had devoted a large part of his life.

#### A CHRONOLOGICAL LIST OF THE PRINTED WORKS AND MANUSCRIPT WRITINGS OF JOHANN PETER SÜSSMILCH.

Dissertatio de cohaesione et attractione corporum. Jenae, 1732. Lit. Ritterianis. 4to. 39 pp.

Die göttliche Ordnung in den Veränderungen des menschlichen Geschlechts, aus der Geburt, Tod, und Fortpflanzung desselben erwiesen. Berlin, 1741. J. C. Spener. 12mo. (First edition edited by Süssmilch himself.)

Die göttliche Ordnung in denen Veränderungen des menschlichen Geschlechts, das ist, gründlicher Beweiss der göttlichen Vorsehung und Vorsorge für das menschliche Geschlecht, etc. Berlin, 1742. D. A. Gohls. 12mo.

Das Frolocken der Brandenburgischen Lande über dem glücklich geendigten Kriege. In einer Predigt. Berlin, 1742. 4to.

<sup>1</sup> See chap. i.

- Die Wichtigkeit einer guten Erziehung, in einer Predigt am ersten Sonntag nach Epiph., 1743, in hiessiger St. Petri Kirche vorgestellt. Berlin, 1743. Christian S. Bergemann. 4to. 8 pp.
- Réflexions sur la convenance de la langue celtique et en particulière de la teutonique avec celles de l'orient. Berlin, 1745. Ak. d. Wiss.
- Anweisung zum frölichen und Gottgefälligen Lob-Gesang über dem am 4ten Junius, 1745, bey Strigau erhaltenen herrlichen Siege in einer Danck-Predigt am letzten Tage des Pfingst-Festes in der Gemeinde zu St. Petri in Cölln vergestellet. Berlin, 1745. 4to. 24 pp. (Printed with the Henning manuscripts.)
- Das unvergessliche Denkmahl der Wunder, so Gott durch die bisherigen siegreichen Unternehmungen Sr. Königl. Majestät von Preussen gestiftet, in der am 4ten Sonntage des Advends 1745 verordneten Dankpredigt der Gemeinde zu St. Petri in Cölln über Psalm 3, v. 4 erkläret. Berlin, 1745. 4to. 18 pp.
- Die Unvernunft und Bosheit des berüchtigten Edelmann's durch seine schändliche Vorstellung des obrigkeitlichen Amtes, aus seinem "Moses mit verdecktem Angesichte" dargethan, und zu aller Menschen Warnung vor Augen gelegt. Berlin, 1747. 8vo.
- Der Brandenburger Patriot oder unparteiische Beurtheilung der errichteten und von Sr. Königl. Majestät in Preussen octroyrten Handlungsgesellschaft. 1751.
- Der Königl. Residentz Berlin Schneller Wachsthum und Erbauung. In zweien Abhandlungen erwiesen. Berlin, 1752. Haude und Spener. 4to. 80 pp. 1. Abhandlung von dem schnellen Wachsthum Der Königl. Residentz Berlin vorgel. in dem Versammlung der Königl. Ak. d. Wiss., Feb. 6, 1749. 2. Abhandlung von dem Alter und der Erbauung der Städte, Berlin und Cölln, worinn höchstwahrscheinlich dargethan wird, dass der Marggraf Adelbert, der Bär, als der Eroberer und Bezwinger der Mittel-Marck Brandenburg, auch der Erbauer dieser Stadt sei. In der Versammlung d. kgl. Ak. d. Wiss., im October, 1750, abgelesen.
- Die gewisse Hoffnung einer seligen Unsterblichkeit als der Grund des getrosten Muthes der Gerechten im Tode. . . . Leichen-Predigt der Herr Christian Campen, Kgl. Preuss. Inspectoris. Berlin, 1752.
- "Verzeichniss Teutscher Wörter in der Altbritischen Sprache" in the "Dictionnaire de la Langue Bretonne," by Louis Le Pelletier. Paris, 1752.
- Bekehrung des Rabbi Jachiels. Berlin, 1754. Bienstiel.
- Bekehrung des Rabbi Jachiels. Berlin, 1758. Lange. 8vo.
- Gottgefällige Glückwünsche bey dem Eintritt in das 1755. Jahr Predigt. Berlin, 1755. 4to. 16 pp.

- Die göttliche Ordnung in den Veränderungen des menschlichen Geschlechts, besonders, im Tode, durch einige neue Beweissthümer bestätigt, und gegen des Königl. Gross Brittanischen Berg-Raths Herrn von Justi Erinnerungen und Muthmaassungen in zweien Send-Schreiben an selbigen gerettet. Berlin, 1756. Haude and Spener. 4to.
- Dank-Predigt wegen der am 1 Oct., 1756, von des Königs von Preussen Maj. über die Oesterreichische Kriegesmacht erfochtenen herrlichen Sieges. . . . Berlin, 1756. 4to. 16 pp.
- Die abermalige Aufforderung zur Verehrung des Herrn durch den Sieg bei Leuthen in der Dank-Predigt erklärt. Berlin, 1757. 4to. 12 pp.
- Heilsame Wirkungen des Tages des Schreckens durch den feindlichen Ueberfall der Stadt Berlin. Berlin, 1757.
- Der grösste und herrlichste unter allen bisherigen Siegen, welchen das Kgl. Preussische Heer am 6ten May, 1757, bey der Böhmischem Hauptstadt Prag unter göttlichem Beystande erfochten. Dank-Predigt. Berlin, 1757. 4to. 16 pp.
- Die Freude über die Güte und Hülfe Gottes an dem Dank- und Siegesfeste wegen des am 5ten Nov., 1757, bei Freyburg . . . verlichenen hochst-wichtigen Sieges in einer Predigt . . . vorgestellt. . . . Berlin, 1757. 4to. 16 pp. Reprinted at Schwabach, 1758. 4to. 12 pp.
- Gedanken von der Epidemischen Krankheiten und dem grössern Sterben des 1757ten Jahres. Berlin, 1758. 4to. Haude and Spener.
- Der grosse Sieg bey Zorndorf . . . als eine Ursache der dankvollsten Freude am 15ten Sonntag nach Trinitatis . . . erkläret. Berlin, 1758. 4to. 22 pp.
- Essai sur le Nombre des Habitans de Londres et de Paris. 1759. (Translation.)
- Die göttliche Ermunterung zum Gebet um Friede . . . Neujahrs-Predigt. Berlin, 1760. 4to. 16 pp.
- Jesus als das beste und nachahmungs würdigste Muster unserer Kindheit und Jugend. A sermon delivered at Cölln the first Sunday after Epiphany, 1701. 8vo. 16 pp.
- Betrachtung einiger Bewegungsgründe zur Barmherzigkeit und thätigen Mitleiden mit seinem Nächsten. . . . Berlin, 1761. 4to.
- Die göttliche Ordnung. Berlin, 1761-62. Im Verlag der Buchhandlung der Realschule. 2 vols. 8vo. (Second edition edited by Stüssmilch himself.)
- Der Bund des Friedens und der Freundschaft mit Russland, als ein herrliches Gnadengeschenk Gottes. Berlin, 1762.
- Catalogue librorum collegit, Dr. J. P. Stüssmilch, notasque litteraris criticas nonnullis libris addidit Dr. J. C. König. Berlin, 1768. G. L. Winter.

Die göttliche Ordnung. Berlin, 1765. G. L. Winter. 2 vols. 8vo.  
(Third and last edition edited by Süssmilch.)

Vorrede zu Krauss' richtiger Chronologie der Bücher der Könige. Jan.  
10, 1765.

Vorrede zu Samuel Buchholtz's Versuch einer Geschichte der Churmark  
Brandenburg. Berlin, 1765-75. 4to.

Versuch eines Beweisses, das die erste Sprache ihren Ursprung nicht von  
Menschen, sondern allein vom Schöpfer erhalten habe. Berlin, 1766.  
8vo.

*Posthumous Publications.*

Specimen etymologici Latini, seu glossarii harmonici Latino-Phoenicii.  
Bibliotheca Hagana. 1768. 8vo.

Centinuatio Speciminis Etymologici. Bibli. Hagana. 1768. 8vo.

De goddelyke orde, herrschende in de veranderingen van het menschelyk  
geschlacht, etc. Amsterdam, 1770-72. P. Meijer. 4 vols. 8vo.

Die göttliche Ordnung. Edited by Ch. J. Baumann. Berlin, 1775-76.  
3 vols. 8vo. Im Verlag der Buchhandlung der Realschule. (Fourth  
edition. Revision by Süssmilch's son-in-law.)

Die göttliche Ordnung. Berlin, Halle (printed) 1787-88. (?)

Die göttliche Ordnung. Berlin, Halle (printed) 1798. 8vo.

*Manuscript Writings (of which some may have been printed).*

Otium Pyrmontanum h. e. dissertatio de origine lapidum, etc. 1745.

Mémoire sur l'origine et l'age de la Ville de Berlin lu à l'Académie Oct. 20,  
1750.

Observationes in linguae britannicae . . . naturam. April 26, 1752.

Anmerkungen zu des Herrn Brownriggs (Bevölkerungs) Rechnung von  
Bristol. In der Ak. d. Wiss. gelesen am 28ten Nov., 1754.

Dissertatio, dass die Menschen nach einer gewissen Regel sterben. In  
der Ak. d. Wiss. gelesen am 28ten Nov., 1755.

Dissertatio academica qua convenientia characterum numericorum, litterarum,  
initialium . . . ostenditur. April 29, 1757.

Dissertatio de Herulis. Oct. 27, 1757.

Five letters written to J. D. Michaelas, dated Berlin, 1758-66, with a statistical abstract "General Liste aller Gestorbenen, Geborenen, und Verheyrateten in allen Kgl. Preuss. Provinzen," containing the total sums for 1751 and 1756.

Teile eines Glossarium Harmonicum.

Commentatio de pago antiquo brandenburgico Belchem.



Commentatio de Stedingis.

Positiones de Theologia morali.

Varia collectanea ad historiam sacram, etc.

Remarques sur l'histoire de Brandenbourg.

Anmerkungen zu Mich. Geddes Betrachtung der Mittel wodurch die Römische Kirche ihre Leute zurückhält, dass sie nicht zu Erkenntniss der Irrthümer gelangen, so sich in ihrem Glauben . . . befinden.

Schediasma de biblorum editionibus rarioribus.

Ob die Religion der Römer vor der christlichen in Ansehung der Bevölkerung eines Landes den Verzug gehabt.

Vorschlag zu einer "Historia naturalis patriae."

Réflexions sur le traité l'homme machine.

Mémoire sur la diminution des mariages et des naissances de quelques provinces de S. M. Roi de Prusse depuis l'an 1754 jusqu' à 1740.

Von der Gefahr der grossen Städte.

Dissertatio problematica, num navigatio et expeditio in terras australes utilis esse possit, et ubi primae sedes sint stabiliendae.

Berechnung des Schadens, welchen die preussischen Lande durch epidemische Seuchen und Kriege in den drei Jahren 1756-58 erlitten haben.

Abhandlungen, worin erwiesen wird, dass der westliche Theil von Europa, besonders Teutschland, zu Julius Cäsar's Zeiten nicht vielmal volkreicher gewesen sein könne als es anjetzo ist; ja dass es damals nicht die Hälfte der jetzigen Einwohner ernähren können. (See "Deutsche Biographie," xxxvii, 193.)

Betrachtungen über die Religion.

It is as an author, and, particularly, as a writer on population statistics that Süssmilch is entitled to recognition from posterity. As the above bibliography indicates, his writings comprise several pamphlets which treat of etymological subjects, some sermons, and a considerable number of statistical pamphlets. His chief merit and fame, however, rest upon one book, *Die Göttliche Ordnung*, which may properly be said to have constituted his principal life work. "*Die Göttliche Ordnung*," says Süssmilch's eulogist, "was properly the occupation of his whole life, the center of all his reflections. After he had formed the plan, he never for

a moment lost sight of it. He gathered from all sides the aids which might enable him to perfect it. He consulted the wise men whose knowledge might widen his own. In a word, never was author seen more filled with his subject, more given over to that sort of enthusiasm which persuades that there is nothing better than what one is doing, and that one is doing it the best that it can be done.”<sup>1</sup>

The first edition of *Die Göttliche Ordnung* was published at Berlin in 1741.

This genuine, original work was followed in 1742 by what John<sup>2</sup> considers to have been an unauthorized edition, an exact copy of the original except that it has a changed and more extended title.<sup>3</sup>

Both imprints of this early edition are extremely rare, and there is, therefore, good reason to believe that only a few copies were printed.<sup>4</sup>

This early edition of *Die Göttliche Ordnung* contains two prefaces; one by the author, and one by the philosopher, Christian Wolff.<sup>5</sup> The author's preface is dated, “On the

<sup>1</sup> Formey in *Histoire de l'Académie Royale des Sciences et Belles-lettres*.

<sup>2</sup> John's *Geschichte der Statistik*, footnote, p. 242.

<sup>3</sup> The title page of the 1741 edition runs as follows: “Die göttliche Ordnung in den Veränderungen des menschlichen Geschlechts, aus der Geburt, Tod, and Fortpflanzung desselben erwiesen von Johann Peter Süssmilch, Prediger bey dem hochloblichen Kalcksteinischen Regiment. Nebst einer Vorrede Herrn Christian Wolffens.”

The 1742 edition bears the following title: “Die göttliche Ordnung in denen Veränderungen des menschlichen Geschlechts, das ist, gründlicher Beweiss der göttliche Vorsehung und Vorsorge für das menschliche Geschlecht aus der Vergleichung der Gebornen und Sterbenden, der Verheiratheten und Gebornen, wie auch in sonderheit aus der beständigen Verhältniss der gebornen Knaben und Mädgens, wobei accurate und Vieljährige Listen der Gebornen und Gestorbenen in allen königlichen Preussischen Ländern, in London, Amsterdam, Paris, Wien, Berlin, Breslau, u. s. w., daraus der Wachsthum und die Anzahl der Einwohner in selbigen Ländern und Städten bestimmt wird, nebst einem Versuch, die Verhältniss der Sterbenden nach dem Alter und nach denen Kranckheiten zu bestimmen und einer Anweisung zur nützlichen Einrichtung der Kirchen-Bücher, u. s. w.

<sup>4</sup> The present writer has never seen a copy of the 1741 edition, but was fortunate enough to obtain for examination a copy of the 1742 imprint, in the Surgeon-General's Library, at Washington.

<sup>5</sup> Wolff's preface may be characterized as a commendation of the book and an apology for its appearance. In the middle of the eighteenth century mathematics was the dominant science. The one requisite that was then thought to constitute the all-in-all of any body of knowledge was exactness. . . . Wolff in his preface endeavors to anticipate any

march to Schweidnitz, March 27, 1741." The dedication is addressed to Frederick II, now better known as Frederick the Great.<sup>1</sup>

In the preface to the first edition of *Die Göttliche Ordnung* Süssmilch says that he was led to investigate the subject of population by the perusal of Derham's *Physico-Theology*, which contained among other things a summary of the observations made by Englishmen concerning lists of births, deaths, and marriages. "Because these remarks were new to me, a desire was awakened for further investigation, and as the great utility of these truths was plainly evident, I became attentive to everything which might strengthen them. When I came back to Berlin from the University<sup>2</sup> there fell into my hands some additional lists, both from Berlin and for the whole country. To my great satisfaction I observed an almost complete agreement of our countries with England in these matters. I got together everything that I could find. The contributions which had been made for some years in Breslau to medicine, physics, and other sciences contained many lists . . . which in great measure confirmed the order observed by the Englishmen . . . As I was gradually led ever farther, the writings of the Lord-Mayor Graunt and of the Knight Petty fell into my hands. . . . To Graunt belongs the highest praise, for he first broke the ice over these new truths, and he first tried, in the search for them, to make use of the London lists. Petty soon followed, and

objection that might be urged against the ideas advanced by Süssmilch on the ground of their exactness. "It was a great folly," says Wolff, "to rather remain entirely ignorant of a thing than be content with a knowledge in which there is not complete certainty. . . . Proofs have been given how probable theories may be turned to account in human life. The present author's book is such a proof, for none can well deny that the knowledge of those things of which he treats have their manifold uses. No one can demand of him demonstrated truths where the probability must satisfy, and those who entirely condemn the undertaking because no certainty is to be had betray their own folly."

<sup>1</sup> Süssmilch, in the preparation of his book, had experienced how extremely difficult it is to gather statistical data without the aid of government. The work is dedicated to the King in the hope that he might see fit officially to promote and encourage the collection and compilation of data relating to population statistics.

<sup>2</sup> It is uncertain what date is here referred to.

in his attempts in political arithmetic not only accepted and confirmed many of Graunt's propositions but also clearly demonstrated their utility in politics and administration."<sup>1</sup>

When Süssmilch had completed the rough draft of his book he was deterred for a time from publishing it, by the appearance of two new works dealing, in part, with the same phenomena. The first was Maitland's *History of the City of London*, published in 1739, which contained numerous observations on the London lists, which had then been kept for more than a century. The second book was Struyck's *Einleitung zur Geographie*, published in the Dutch language in 1740.

Struyck had brought together the main facts found in Graunt, Petty, and Maitland and had added some new lists for Holland. Struyck's attention was chiefly directed to the political uses of these lists, and especially to their utility in determining life annuities. "But, as for the rest," says Süssmilch, "it appears that Struyck desired rather to collect these data for the first time than to give a complete treatment. Therefore, after some delay, I held to the conclusion I had once formed, especially since all the works mentioned are rarely found and little read in our country."<sup>2</sup>

The election of Süssmilch to membership in the Berlin Academy, in 1745, seems to have been largely due to the publication of *Die Göttliche Ordnung*. After his admission to the Academy, Maupertuis, its president and Frederick's literary assistant, urged him to make the observations contained in his book subjects for discussion before the Academy. The invitation was accepted, and in this way many improvements and extensions were made to the first edition. Süssmilch seems always to have taken a lively interest in the

<sup>1</sup> Preface to the first edition of *Die Göttliche Ordnung*.

<sup>2</sup> Besides Struyck, Kersseboom wrote in Holland (1737-42) on the subject of population. Süssmilch, in his first edition, was unacquainted with Kersseboom's writings, and Kersseboom, though he wrote two pamphlets in 1742, was not acquainted with Süssmilch's work. Knapp, *Théorie des Bevolkerungs-Wechsels*, p. 76.

proceedings and an active part in the discussions of the Academy.

There is no reason to suppose that the first edition of *Die Göttliche Ordnung* was widely read or attracted much attention beyond the local circle of Berlin. It is important to note, however, that there was one critic whom Süssmilch attempted to answer.<sup>1</sup> Von Justi, in the *Gottingen Policey-Amts-Nachrichten*, took occasion to question some of the conclusions reached by Süssmilch, and particularly the statement that more persons die, reckoned on the basis of the total population, in the cities than in the country districts. Von Justi took opposite ground declaring that more people die in the rural districts than in the cities, as compared with the respective populations. Von Justi asserted that deaths were less frequent in the cities proportionately to population because of the large number of temporary residents, the majority of whom were of an age when deaths are comparatively infrequent. He held that the city inhabitants were largely composed of servants, coachmen, travelling artisans, soldiers, etc., together forming an element of the population sufficiently important to reduce the death rates in the cities below those of the rural districts. In *Die Göttliche Ordnung* the deaths in cities had been given as, on the average, about one in thirty, and in the country as about one in forty of the living inhabitants. Von Justi claimed that in cities one in sixty, or in very populous cities, like London and Paris, one in one hundred would represent the proportion more nearly corresponding to the facts.

In 1756 Süssmilch published two letters in answer to this criticism of Von Justi and to other minor criticisms by the same author. After a careful analysis of all the data obtainable, he had become strengthened in the opinion that death

<sup>1</sup> Criticisms upon *Die Göttliche Ordnung* appeared in the *Gottinger Gelehrten-Anzeigen* (1756, 1761, and 1762). These were written by Haller, and were concerned with the physiological and scientific aspects of Süssmilch's researches. Wappaus, *Studium der Statistik*, p. 79.

rates are higher in the cities than in the rural districts.<sup>1</sup> The facts which were presented at this time, and the conclusions reached, are given in substantially the same form in the second edition of *Die Göttliche Ordnung*, published in 1761 and 1762.

This second edition is an entirely new revision of the first. A comparison of the two as regards size will give some idea of the extensions which Süssmilch had seen fit to make during the twenty years (1741-61) which separated them. The first edition was a small octavo volume of 356 pages. It contained nine chapters, and an appendix of eighteen tables. The second edition is composed of two quarto volumes of 576 and 625 pages, respectively, exclusive of the appendices, which together contain sixty-eight tables. The chapters have increased from nine to twenty-five.

If further evidence is wanted to prove how much labor must have been expended in recasting the first edition, we have Süssmilch's own testimony. He informs us that his evening hours for a period of two years were spent in revising a single chapter.<sup>2</sup> When at last he determined to rewrite the whole book, he labored at the task during all his spare time for a period of three years before the first part was sent to the press.<sup>3</sup>

This new edition is also dedicated to Frederick II, who had given, says the author, convincing proofs of his discernment of the utility of the observations contained in the first

<sup>1</sup> For a long time after the publication of these letters Von Justi made no rejoinder, directly or indirectly. Soon after the letters were published, Süssmilch met Von Justi, but his critic gave no hint that he still held to his former opinions. Süssmilch naturally assumed that this silence indicated Von Justi's conversion. He was mistaken. In 1760, Von Justi published a work on *Staatswissenschaft*, in which he held to his former opinions without any modifications or further proofs in support of them. This book did not come to Süssmilch's notice until the first part of the second edition of *Die Göttliche Ordnung* was nearly printed. Süssmilch confessed his astonishment at Von Justi's course, but did not think it worth while to reopen the controversy. *Die Göttliche Ordnung*, 2nd ed., vol. ii, note pp. viii-x.

<sup>2</sup> This statement is made in the second letter in answer to Von Justi. The chapter to which reference is made is chap. vi, Deaths by Ages.

<sup>3</sup> Preface to the second edition of *Die Göttliche Ordnung*.

edition.<sup>1</sup> The king, too, throughout his reign had demonstrated that he held a rational *Bevölkerung* to be the chief duty of a ruler, and had given a substantial proof of the importance which he attached to data relating to population. In June, 1747, he had ordered, not only that lists should be drawn up in all the Prussian provinces, but, in addition, data was to be collected for the preceding fifteen years.<sup>2</sup>

In 1765 appeared the third edition of *Die Göttliche Ordnung*. This was the last edition to come under the author's eye.

The original edition contained the germ of all the more important ideas found in the later editions. The ideas are put in a better dress in the later editions; the arrangement, while still in many ways unsatisfactory, is more logical; and the larger amount of data at the author's command naturally necessitated the introduction of slight corrections in some of the many ratios which had been presented in 1741.<sup>3</sup>

<sup>1</sup> One imprint of this second edition contains, besides the dedication to Frederick the Great, a dedication to Peter III of Russia.

<sup>2</sup> John, *Geschichte der Statistik*, pp. 270, 271.

<sup>3</sup> Knapp's assertion (*Théorie des Bevölkerungs-Wechsels*, p. 76) that the second edition of *Die Göttliche Ordnung* has risen from an insipid theodicy to a national economic and political work is perhaps a little misleading. While the theological considerations do not form so large a part of the second edition as of the first, there are quite as many of them in the later edition. In the extensions, however, emphasis was laid upon the scientific, rather than upon the theological discussions. From this point of view, the later edition is less dominantly theological than the first, though the theological undercurrent is still strong.